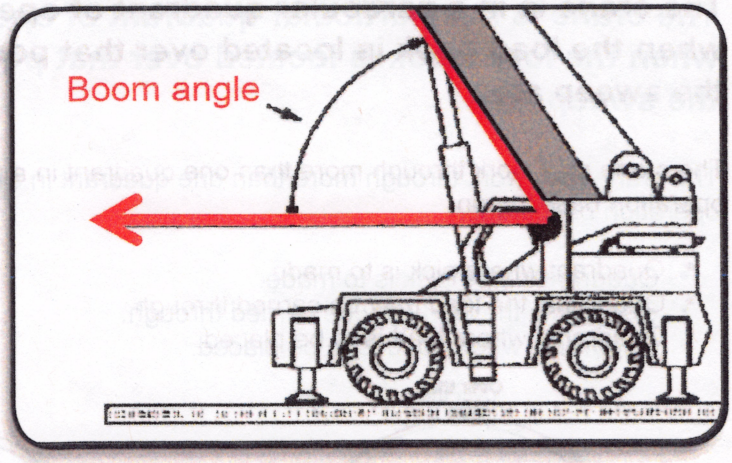
Module 19
Load Chart Components



Learning Objectives

By the end of this section, you will:

1. Know the term quadrants of operation.
2. Know how to measure boom and jib angles on lattice and telescopic boom cranes.
3. Be able to determine boom length for lattice and telescopic boom cranes.
4. Know the term boom point elevation and explain its importance.

What are the considerations that affect crane capacity?

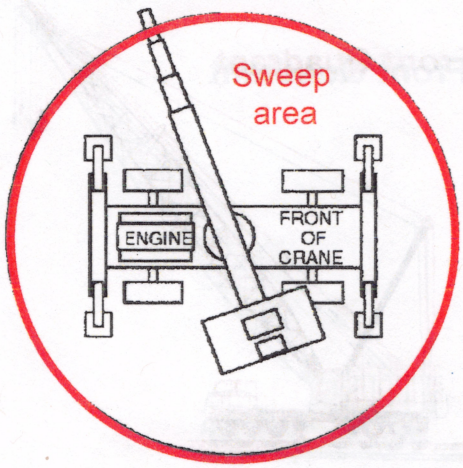
- » Load weight.
- » Use of outriggers.
- » Boom quadrant of operation.
- » Load radius.
- » Boom and jib angle.
- » Boom length.
- » Line pull.
- » Environment.

Quadrants of Operation

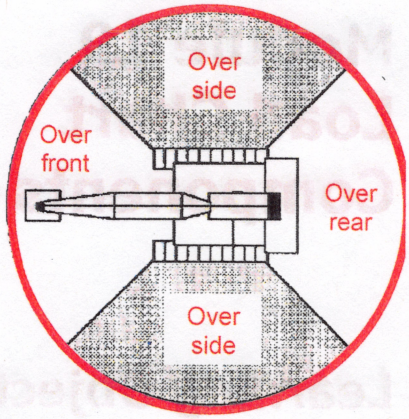
The working quadrant, or work area, is a critical factor in determining capacity.

Typically, working over one end of the crane will be designated for maximum capacity. Working over the other end or side may reduce capacity. Operators should work in the most stable quadrant whenever possible.

Capacity ratings change within different portions of the sweep area.

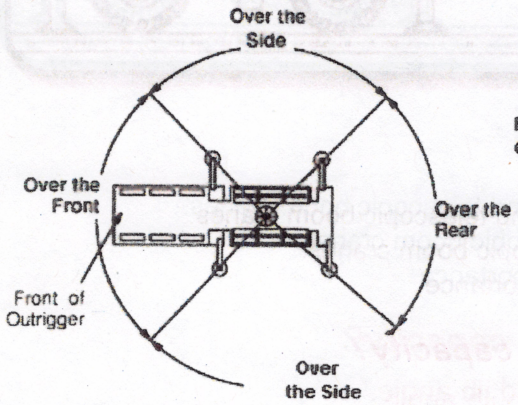


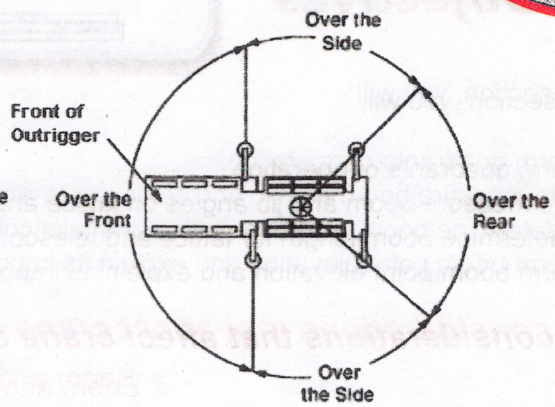
The crane is in a particular quadrant of operation when the load hook is located over that portion of the sweep area.



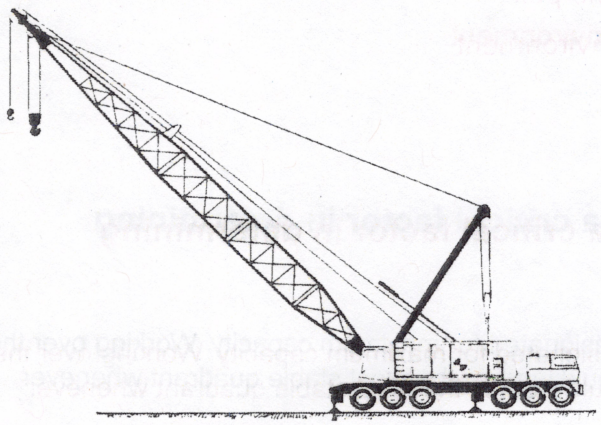
The crane may work through more than one quadrant in a given operation based upon:

- Quadrant where pick is to made.
- Quadrants the load may be carried through.
- Quadrants where load is to be placed.

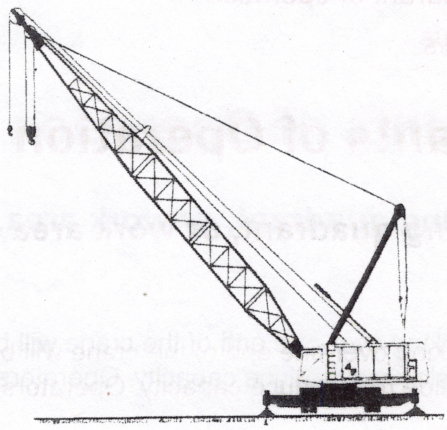




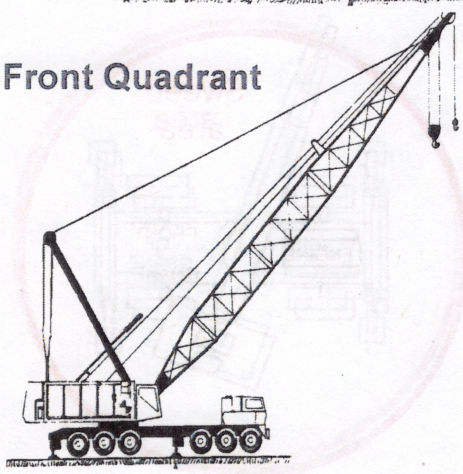
Rear Quadrant



Side Quadrants



Front Quadrant



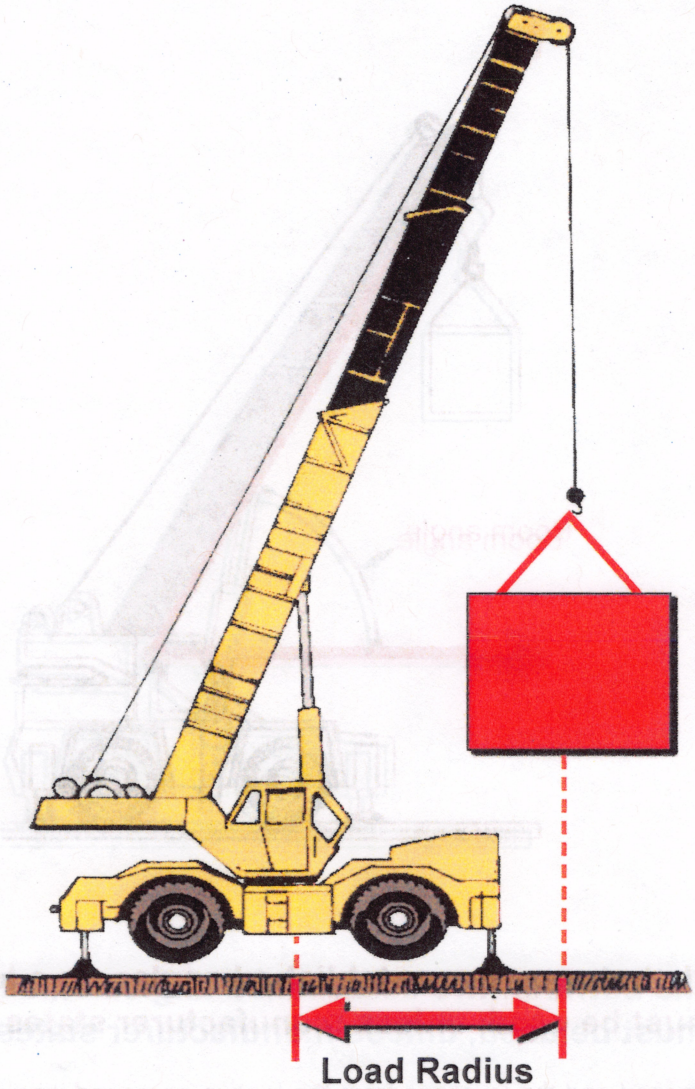
C of G of the crane changes when swung from one quadrant to another.

Load Radius

Load radius is the horizontal distance from the projection to the ground of the axis of rotation before loading to the center of a loaded but vertical hoist line.

OSHA 1926.1401

The load radius will increase when the load is lifted off the ground due to the deflection of the boom and machine, and pendant stretch. Deflection is greater for a crane on rubber due to tire deflection.

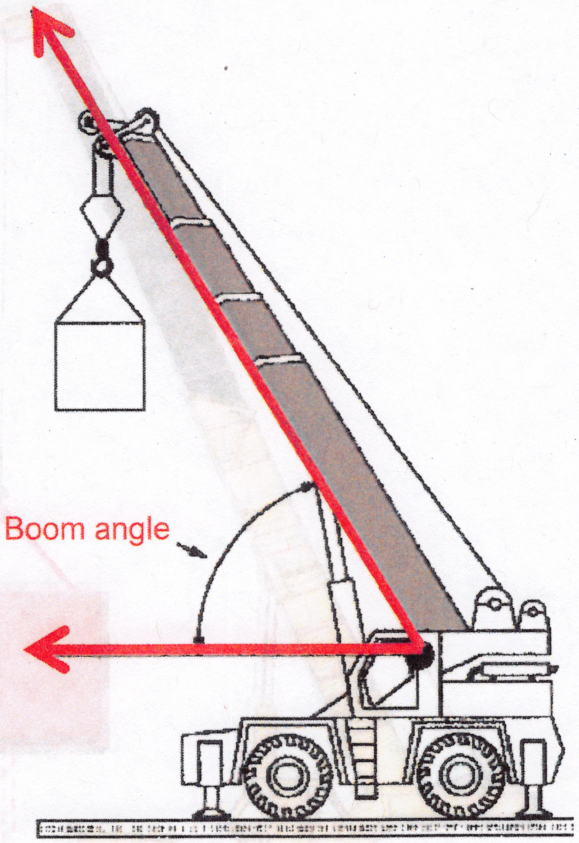


Boom Angle

On lattice cranes, the boom angle is measured between the center line of the boom and a horizontal.

Boom angles indicate the angle while the boom is suspending the rated maximum load. Boom angles are normally used for reference. Boom angles are spelled out in the lifting notes.

On telescopic boom cranes, the boom angle is the angle between the bottom of the base section of the main boom and a horizontal.

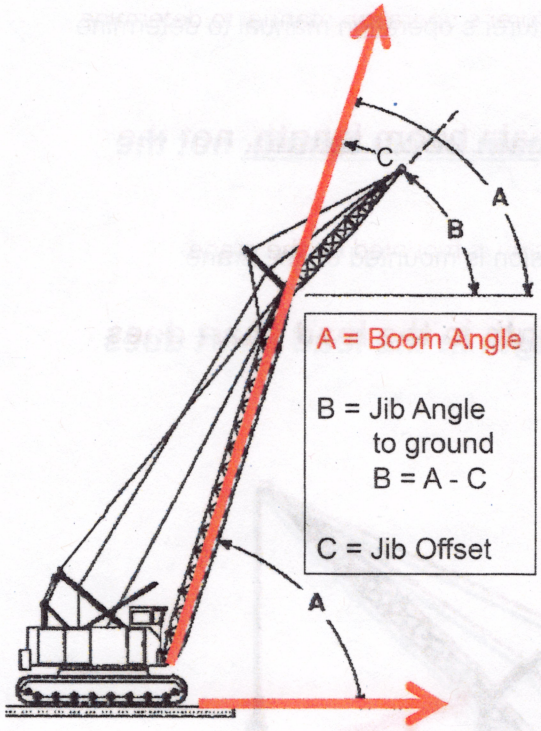


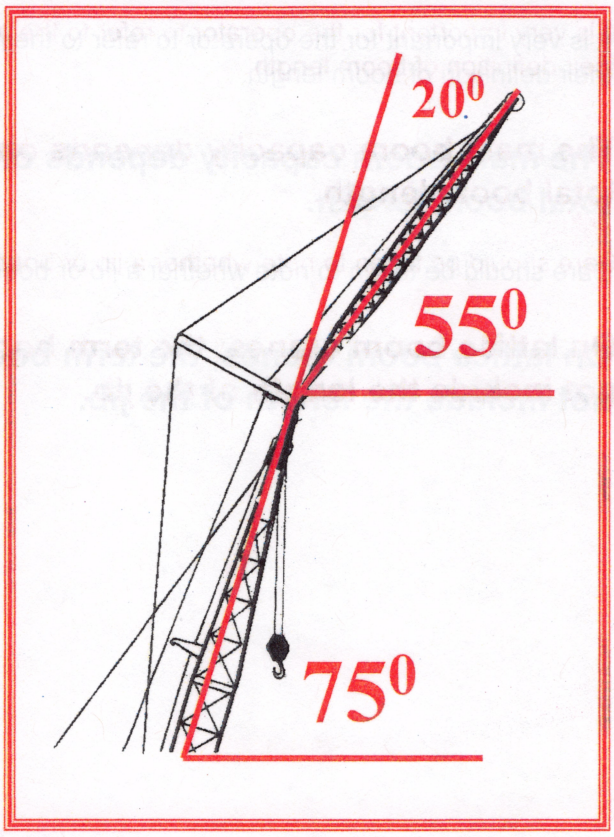
When a value falls between two established angles on a load chart, the lower capacity must be used, unless manufacturer states otherwise.

As boom angle is decreased and the leverage from the load is increased, tipping can occur. Operators should not assume that outriggers will prevent tipping.

Jib Angle

Jib angle to ground is the main boom angle minus jib offset.





Case Study

An All Terrain crane tipped over at a water pumping plant in Dallas, injuring two. The crane, a four axle 100 ton Grove GMK was lifting a 26 foot long pump housing weighing nine tons, over the top of the pump house with its full boom extended over the rear. The crane was clearly overloaded as the radius increased, causing it to tip with the boom crashing down on the building. The crane's boom came down on a 56-year-old man on the roof, trapping and crushing his legs, while the load dropped behind the building onto two parked vehicles seriously injuring another man in one of them.

http://www.vertikal.net/en/news/story/6559/

Boom Length

The length of the boom is a critical factor in determining capacity.

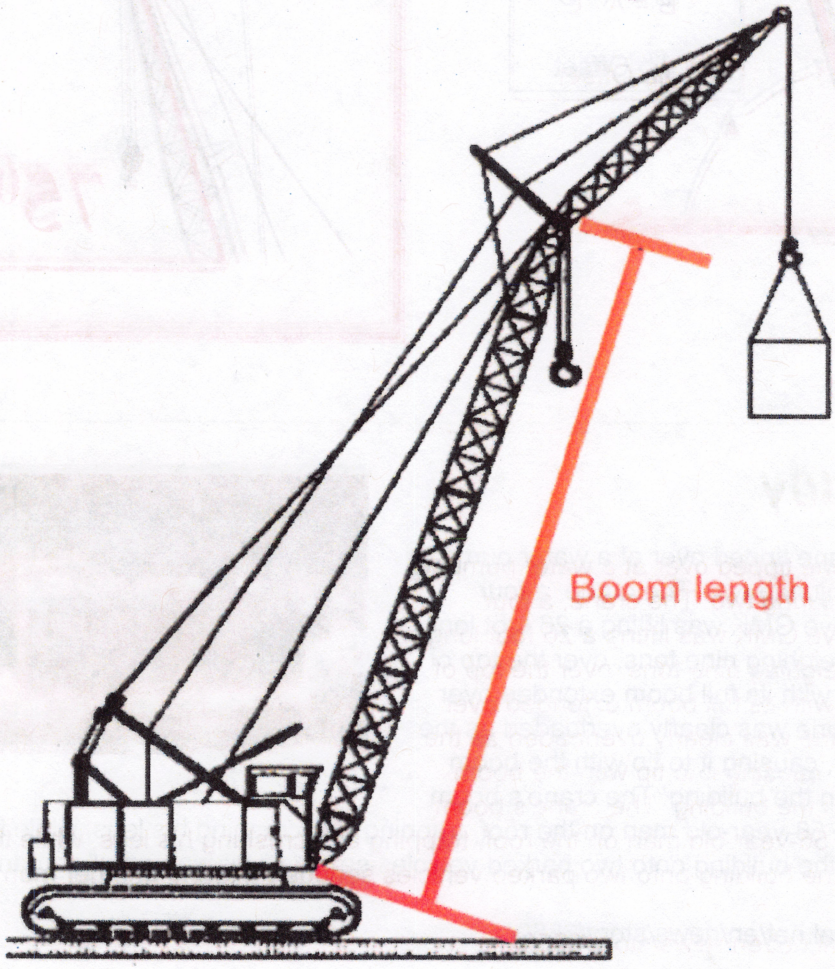
The manufacturer's definition of boom length is always the correct one.

It is very important for the operator to refer to the manufacturer's operation manual to determine their definition of boom length.

The main boom capacity depends on the main boom length, not the total boom length.

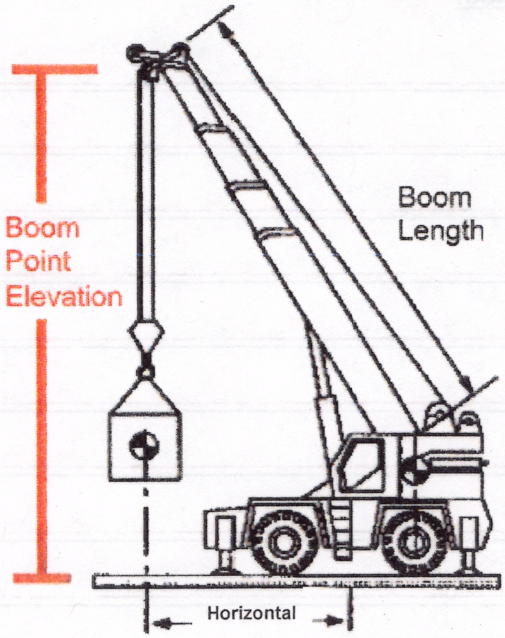
Care should be taken to note whether a jib or boom extension is mounted on the crane.

On lattice boom cranes, the term boom length in the load chart does not include the length of the jib.



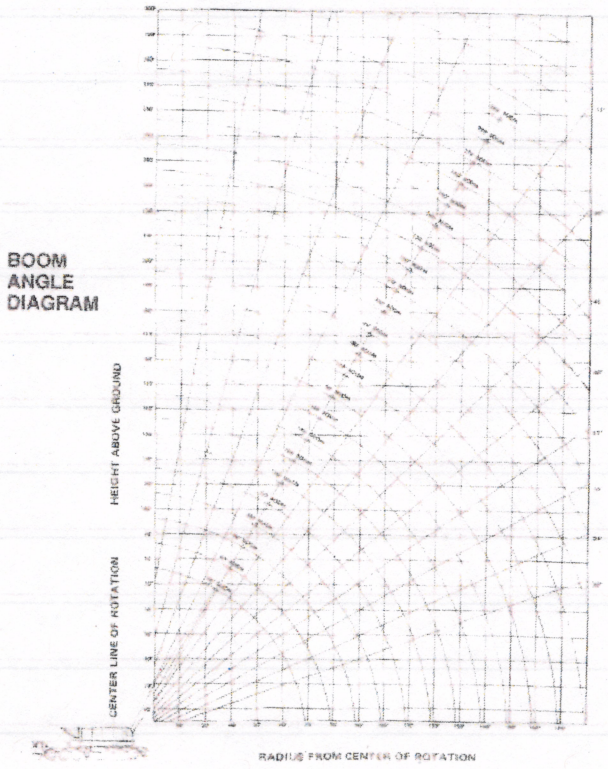
Boom Point Elevation

The boom point elevation is a vertical line measured from the center of the boom point sheaves to the crane base elevation.



On some lattice boom cranes, boom point elevations are given for boom length and radii.

MODEL 9530 WORKING RANGES



77H HAMMERHEAD BOOM RATINGS
With 75,000 # CTWT.*

Boom Length In Feet	Radius In Feet	Boom Angle Degrees	Outriggers Fore		Outriggers Extended and Set		Ft. From Boom Pt. to Ground
			Over Side	Over Rear	Over Side	Over Rear	
110 feet cont.	60	61.4	28970	34000	70530	85160	105
	70	55.3	23350	27380	58330	70490	99
	80	48.6	19040	22490	48250	59600	91
	90	41.2	15610	18530	40210	51200	81
	100	32.3	12810	15560	34840	44400	67
	110	20.1	10440	13010	30120	38660	46
120 feet	22	82.8	-	120320	282720	282720	128
	25	81.5		102840	241980	241980	127
	30	79.1		82190	194380	194380	126
	35	76.7	54680	67910	160550	161770	125
	40	74.2	47270	57430	130550	138030	124
	50	69.2	36220	43080	83900	105770	121
	60	64.0	28580	33720	72340	84850	116
	70	58.5	22980	27110	58130	70180	111
	80	52.7	18680	22100	48050	58300	104
	90	46.4	15270	18380	40510	50570	95
	100	39.3	12490	15320	34650	44210	84
	110	30.9	10160	12810	29960	38500	70
	120	19.2	8160	10690	26090	33810	47

Notes: